NORTH CAROLINA DEPARTMENT OF TRANSPORTATION

DIVISION OF HIGHWAYS GEOTECHNICAL UNIT

SUBSURFACE INVESTIGATION

SOIL AND ROCK LEGEND, TERMS, SYMBOLS, AND ABBREVIATIONS							
SOIL DESCRIPTION GRADATION				ROCK DESCRIPTION			TERMS AND DEFINITIONS
SOIL IS CONSIDERED TO BE THE UNCONSOLIDATED, SEMI-CONSOLIDATED OR WEATHERED EARTH MATERIALS		WELL GRADED- INDICATES A GOOD REPRESENTATION OF PARTICLE SIZES FROM FINE TO COARSE UNIFORM- INDICATES THAT SOIL PARTICLES ARE ALL APPROXIMATELY THE SAME SIZE. (ALSO		HARD ROCK IS NON-COASTAL PLAIN MATERIAL THAT WHEN TESTED, WOULD YIELD SPT REFUSAL. AN INFERRED			ALLUVIUM (ALLUV.) - SOILS WHICH HAVE BEEN TRANSPORTED BY WATER.
WHICH CAN BE PENETRATED WITH A CONTINUOUS FLIGHT POWER AUGER, AND WHICH YIELDS LESS THAN		I POORLY GRADED)		ROCK LINE INDICATES THE LEVEL AT WHICH NON-COASTAL PLAIN MATERIAL WOULD YIELD SPT REFUSAL. SPT REFUSAL IS PENETRATION BY A SPLIT SPOON SAMPLER EQUAL TO OR LESS THAN Ø1 FOOT PER 60 BLOWS.			AQUIFER - A WATER BEARING FORMATION OR STRATA
1 100 Blows per foot according to standard penetration test (aashto 1206, astm D-1586). Soil classification is based on the Aashto System and Basic descriptions generally shall include:		GAP-GRADED- INDICATES A MIXTURE OF UNIFORM PARTICLES OF TWO OR MORE SIZES.		IN NON-COASTAL PLAIN MATERIAL, THE TRANSITION BETWEEN SOIL AND ROCK IS OFTEN REPRESENTED BY A ZONE		TEN REPRESENTED BY A ZONE	
CONSISTENCY, COLOR, TEXTURE, MOISTURE, AASHTO CLASSIFICATION, AND OTHER PERTINENT FACTORS SUCH		ANGULARITY OF GRAINS		OF WEATHERED ROCK. ROCK MATERIALS ARE TYPICALLY DIVIDED AS FOLOWS:			ARENACEOUS - APPLIED TO ROCKS THAT HAVE BEEN DERIVED FROM SAND OR THAT CONTAIN SAND.
AS MINERALOGICAL COMPOSITION, ANGULARITY, STRUCTURE, PLA		THE ANGULARITY OR ROUNDNESS OF SOIL GRAINS ARE DESIGNATED BY THE	E TERMS: ANGULAR.				ARGILLACEOUS - APPLIED TO ALL ROCKS OR SUBSTANCES COMPOSED OF CLAY MINERALS,
VERY STIFF, GRAY SATY CLAY, MOIST WITH INTERBEDDED	FINE SAND LAVERS, HIGHLY PLASTIC, A-7-6	SUBANGULAR, SUBROUNDED, OR ROUNDED.		WEATHERED BOOK (MR)	WEATHERED NON-COASTAL PLAIN MATERIAL THAT YIELDS SPT N VALUES > 100 BLDWS PCR FOOT.		OR HAVING A NOTABLE PROPORTION OF CLAY IN THEIR COMPOSITION, AS SHALE, SLATE, ETC.
SOIL LEGEND AND AASHT	O CLASSIFICATION	MINERALOGICAL COMPOSITION		A PARTY CONTRACTOR OF THE PART		0.0001/ 711/7	ARTESIAN - GROUND WATER THAT IS UNDER SUFFICIENT PRESSURE TO RISE ABOVE THE LEVEL AT WHICH IS IS ENCOUNTERED, BUT WHICH DOES NOT NECESSARILY RISE TO OR ABOVE THE
	CLAY MATERIALC	MINERAL NAMES SUCH AS QUARTZ, FELDSPAR, MICA, TALC, KAOLIN, ETC. ARE		CRYSTALLINE ROCK (CR)	WOULD YIELD SPT REFUSAL IF TESTED. ROCK TYPE	C RUCK THAT E INCLUDES GRANTTE.	GROUND SURFACE.
	7. PASSING *200) ORGANIC MATERIALS	WHENEVER THEY ARE CONSIDERED OF SIGNIFICANCE.		NUCK (CR)	GNEISS, GABBRO, SCHIST, ETC.	·	CALCAREOUS (CALC.) - SOILS WHICH CONTAIN APPRECIABLE AMOUNTS OF CALCIUM CARBONATE.
GROUP A-1 A-3 A-2 A-4	1 A-5 A-6 A-7 A-1, A-2 A-4, A-5	COMPRESSIBILITY		NON-CRYSTALLINE	FINE TO COARSE GRAIN METAMORPHIC AND NON-CO	ASTAL PLAIN	COLLUVIUM - ROCK FRAGMENTS MIXED WITH SOIL DEPOSITED BY GRAVITY ON SLOPE OR AT BOTTOM
CLASS. A-1-0 A-1-6 A-2-4 A-2-5 A-2-6 A-2-7	A-7-6 A-7-6 A-3 A-6, A-7		T LESS THAN 30	ROCK (NCR)	INCLUDES PHYLLITE, SLATE, SANDSTONE, ETC.	SAL IF TESTELL RUCK TIPE	OF SLOPE.
SYMBOL SSSSSSSSSSSSSSSSSSSSSSSSSSSSSSSSSSSS		MODERATELY COMPRESSIBLE LIQUID LIMI		COASTAL PLAIN SEDIMENTARY ROCK	COASTAL PLAIN SEDIMENTS CEMENTED INTO ROCK,	BUT MAY NOT YIELD	CORE RECOVERY (REC.) - TOTAL LENGTH OF ALL MATERIAL RECOVERED IN THE CORE BARREL DIVIDED BY TOTAL
00000000000000000000000000000000000000		9	T GREATER THAN 50	(CP)	SPT REFUSAL. ROCK TYPE INCLUDES LIMESTONE, SA SHELL BEDS, ETC.	ANDSTUNE, CEMENTED	LENGTH OF CORE RUN AND EXPRESSED AS A PERCENTAGE.
% PASSING * 10 50 MX	GRANULAR SILT- MUCK,	PERCENTAGE OF MATERIA GRANULAR SILT- CLAY	<u> </u>		WEATHERING		DIKE - A TABULAR BODY OF IGNEOUS ROCK THAT CUTS ACROSS THE STRUCTURE OF ADJACENT
* 40 30 MX50 MX51 MN	COTIO LLAY DEAT	ORGANIC MATERIAL SOILS SOILS	OTHER MATERIAL				ROCKS OR CUTS MASSIVE ROCK.
# 200 15 MX 25 MX 10 MX 35 MX 35 MX 35 MX 35 MX 36 M	IN 36 MN 36 MN SOILS SOILS	TRACE OF ORGANIC MATTER 2 - 3% 3 - 5% T	RACE 1 - 10%	FRESH ROCK FRESH, CRY HAMMER IF CRYS	STALS BRIGHT, FEW JOINTS MAY SHOW SLIGHT STAINING.	ROCK RINGS UNDER	DIP - THE ANGLE AT WHICH A STRATUM OR ANY PLANAR FEATURE IS INCLINED FROM THE
LIQUID LIMIT 40 MX41 MN 40 MX41 MN 40 MX	1X 41 MN 49 MX41 MN		ITTLE 10 - 20%		FRESH, JOINTS STAINED, SOME JOINTS MAY SHOW THIN	CLAY COATINGS IS OBEN	HORIZONTAL.
PLASTIC INDEX 6 MX N.P. 10 MX 10 MX 11 MN 11 MN 10 MX	X IQ MX 11 MN II MN JUTTUE OD	1	OME 20 - 35% IGHLY 35% AND ABOVE		BROKEN SPECIMEN FACE SHINE BRIGHTLY, ROCK RINGS U		<u>DIP DIRECTION (DIP AZIMUTH) -</u> THE DIRECTION OR BEARING OF THE HORIZONTAL TRACE OF THE LINE OF DIP, MEASURED CLOCKWISE FROM NORTH,
	X 12 MX 16 MX No MX MODERATE ORGANIC		JOILE JOA NITU HOUTE	OF A CRYSTALLI			
 	AMOUNTS OF SOILS	GROUND WATER			FRESH, JOINTS STAINED AND DISCOLORATION EXTENDS 1		FAULT - A FRACTURE OR FRACTURE ZONE ALONG WHICH THERE HAS BEEN DISPLACEMENT OF THE SIDES RELATIVE TO ONE ANOTHER PARALLEL TO THE FRACTURE.
OF MATOR COAVEL AND FINE SILTY OR CLAYEY SI	ILTY CLAYEY ORGANIC	WATER LEVEL IN BORE HOLE IMMEDIATELY AFTE	R DRILLING.		INTS MAY CONTAIN CLAY. IN GRANITOID ROCKS SOME OCC		
MATERIALS SAND SAND GRAVEL AND SAND SC	OILS SOILS MATTER	▼ STATIC WATER LEVEL AFTER 24 HOURS.			DULL AND DISCOLORED. CRYSTALLINE ROCKS RING UNDER		FISSILE - A PROPERTY OF SPLITTING ALONG CLOSELY SPACED PARALLEL PLANES.
GEN, RATING	FAIR TO SOOD WASTER	PERCHED WATER, SATURATED ZONE OR WATER BEA	APINC STRATA		ITIONS OF ROCK SHOW DISCOLORATION AND WEATHERING MOST FELDSPARS ARE DULL AND DISCOLORED, SOME SH		FLDAT - ROCK FRAGMENTS ON SURFACE NEAR THEIR ORIGINAL POSITION AND DISLODGED FROM PARENT MATERIAL.
AS A EXCELLENT TO GOOD SUBGRADE	FAIR TO POOR POOR UNSUITABLE	Taronas wirangonominas asia sik wiran bar	MINIO SIRNIN	DULL SOUND UND	ER HAMMER BLOWS AND SHOWS SIGNIFICANT LOSS OF ST		
P.I. OF A-7-5 ≤ L.L 30 : P.I.	DE A-7-6 11 - 30	SPRING OR SEEPAGE		WITH FRESH ROC			FLOOD PLAIN (F.P.) - LAND BORDERING A STREAM, BUILT OF SEDIMENTS DEPOSITED BY THE STREAM.
CONSISTENCY OR		MISCELLANEOUS SYMBOL	<u> </u>		T QUARTZ DISCOLORED OR STAINED, IN GRANITOID ROCKS		FORMATION (FM.) - A MAPPABLE GEOLOGIC UNIT THAT CAN BE RECOGNIZED AND TRACED IN
DAN	WEE OF STANDARD RANGE OF UNCONFINED				AND A MAJORITY SHOW KAOLINIZATION. ROCK SHOWS SE AVATED WITH A GEOLOGIST'S PICK, ROCK GIVES "CLUNK":		THE FIELD.
	RATION RESISTENCE COMPRESSIVE STRENGTH	ROADWAY EMBANKMENT WITH SOIL DESCRIPTION SPT CPT OPT DAT TEST BOF	ING SAMPLE		D YIELD SPT REFUSAL	John Mill Stribott	JOINT - FRACTURE IN ROCK ALONG WHICH NO APPRECIABLE MOVEMENT HAS OCCURRED.
	(N-VALUE) (TONS/FT ²)	WITH SOIL DESCRIPTION VST PMT	DESIGNATIONS	SEVERE ALL ROCKS EXCE	PT QUARTZ DISCOLORED OR STAINED. ROCK FABRIC CLEAR	R AND EVIDENT BUT REDUCED	
GENERALLY VERY LOOSE	<4	SOIL SYMBOL AUGER BORING	S- BULK SAMPLE		STRONG SOIL, IN GRANITOID ROCKS ALL FELDSPARS ARE	E KAOLINIZED TO SOME	LEDGE - A SHELF-LIKE RIDGE OR PROJECTION OF ROCK WHOSE THICKNESS IS SMALL COMPARED TO ITS LATERAL EXTENT.
GRANULAR LOOSE MEDIUM DENSE	4 TO 10 10 TO 30 N/A	MT			EXTENT. SOME FRAGMENTS OF STRONG ROCK USUALLY REMAIN. IF TESTED YIELDS SPT N VALUES > 100 BPF		LENS - A BODY OF SOIL OR ROCK THAT THINS OUT IN ONE OR MORE DIRECTIONS.
MATERIAL (NON-COHECIVE) DENSE 30 TO 50		ARTIFICIAL FILL OTHER THAN ROADWAY EMBANKMENTS CORE BORING SS- SPLIT SPOON SAMPLE		VERY SEVERE ALL ROCK EXCEPT QUARTZ DISCOLORED OR STAINED, ROCK FABRIC ELEMENTS ARE DISCERNIBLE BUT		CNTC ADE DICCEDNIDI E DUT	MOTTLED (MOT.) - IRREGULARLY MARKED WITH SPOTS OF DIFFERENT COLORS, MOTTLING IN
VERY DENSE	>50	W	ST- SHELBY TUBE		FECTIVELY REDUCED TO SOIL STATUS. WITH ONLY FRAGM		SOILS USUALLY INDICATES POOR AERATION AND LACK OF GOOD DRAINAGE.
VERY SOFT <2 <0.25		INFERRED SOIL BOUNDARIES MONITORING WELL SAMPLE		REMAINING. SAPROLITE IS AN EXAMPLE OF ROCK WEATHERED TO A DEGREE SUCH THAT ONLY MINOR		EE SUCH THAT ONLY MINOR	PERCHED WATER - WATER MAINTAINED ABOVE THE NORMAL GROUND WATER LEVEL BY THE PRESENCE OF AN
GENERALLY SOFT 2 TO 4 0.25 TO 0.5		INFERRED ROCK LINE PIEZOMETER RS- ROCK SAMPLE		VESTIGES OF THE ORIGINAL ROCK FABRIC REMAIN. <u>IF TESTED, YIELDS SPT N VALUES < 100 BPF</u>		SPT N VALUES < 100 BPF	INTERVENING IMPERVIOUS STRATUM.
MATERIAL STIFF	4 TO 8 8 TO 15 0.5 TO 1 1 TO 2	△ INCTALLATION	RT- RECOMPACTED		O SOIL. ROCK FABRIC NOT DISCERNIBLE, OR DISCERNIBLE		RESIDUAL SOIL - SOIL FORMED IN PLACE BY THE WEATHERING OF ROCK.
(COHESIVE) VERY STIFF 15 TO 30 2 TO 4		→ SLOPE INDICATOR TRIAXIAL SAMPLE		SCATTERED CONCENTRATIONS. QUARTZ MAY BE PRESENT AS DIKES OR STRINGERS. SAPROLITE IS ALSO AN EXAMPLE.		RINGERS. SAPROLITE IS	ROCK QUALITY DESIGNATION (R.O.D.) - A MEASURE OF ROCK QUALITY DESCRIBED BY: TOTAL LENGTH OF
HARD >30 >4		25/025 DIP/DIP DIRECTION OF INSTALLATION OR - OR SAMPLE					ROCK SEGMENTS EQUAL TO OR GREATER THAN 4 INCHES DIVIDED BY THE TOTAL LENGTH OF CORE RUN AND
TEXTURE OR GRAIN SIZE		ROCK STRUCTURES SPT N-VALUE		ROCK HARDNESS			EXPRESSED AS A PERCENTAGE.
U.S. STD. SIEVE SIZE 4 10 40	10 60 200 270	* ACCUMPANCE FOR		VERY HARD CANNOT BE SCRATCHED BY KNIFE OR SHARP PICK. BREAKING OF HAND SPECIMENS REQUIRES		SPECIMENS REQUIRES	SAPROLITE (SAP.) - RESIDUAL SOIL WHICH RETAINS THE RELIC STRUCTURE OR FABRIC OF THE PARENT ROCK.
U.S. STD. SIEVE SIZE 4 10 40 60 200 270 OPENING (MM) 4.76 2.0 0.42 0.25 0.075 0.053		(REF)— 31 TILL USAL		SEVERAL HARD BLOWS OF THE GEOLOGISTS PICK.			SILL - AN INTRUSIVE BODY OF IGNEOUS ROCK OF APPROXIMATELY UNIFORM THICKNESS AND
COAPSE FINE		ABBREVIATIONS	ABBREVIATIONS		HARD CAN BE SCRATCHED BY KNIFE OR PICK ONLY WITH DIFFICULTY, HARD HAMMER BLOWS REQUIRED TO DETACH HAND SPECIMEN.		RELATIVELY THIN COMPARED WITH ITS LATERAL EXTENT, WHICH HAS BEEN EMPLACED PARALLEL
BOULDER CUBBLE GRAVEL SAI	AND SAND SILT CLAY	AR - AUGER REFUSAL PMT - PRESSUREMETER TEST				NOUTO DEED OUT DE	TO THE BEDDING OR SCHISTOSITY OF THE INTRUDED ROCKS
(BLDR.) (COB.) (GR.) (CSE. SD.) (F. SD.) (SL.) (CL.)		BT - BORING TERMINATED SD SAND, SANDY		MODERATELY CAN BE SCRATCHED BY KNIFE OR PICK, GOUGES OR GROOVES TO 0.25 INCHES DEEP CAN BE HARD EXCAVATED BY HARD BLOW OF A GEOLOGISTS PICK, HAND SPECIMENS CAN BE DETACHED			SLICKENSIDE - POLISHED AND STRIATED SURFACE THAT RESULTS FROM FRICTION ALONG A FAULT OR
GRAIN MM 305 75 2.0	0.25 0.05 0.005	CL CLAY SL SILT, SILTY SLI - SLICHTLY		BY MODERATE BLOWS.			SLIP PLANE.
SIZE IN. 12' 3'		CPT - CONE PENETRATION TEST SLI SLIGHTLY CSE COARSE TCR - TRICONE REFUSAL		MEDIUM CAN BE GROOVED OR GOUGED 0.05 INCHES DEEP BY FIRM PRESSURE OF KNIFE OR PICK POINT.			STANDARD PENETRATION TEST (PENETRATION RESISTANCE) (SPT) - NUMBER OF BLOWS (N OR B.P.F.) OF A 140 LB. HAMMER FALLING 30 INCHES REQUIRED TO PRODUCE A PENETRATION OF 1 FOOT INTO SOIL WITH
SOIL MOISTURE - CORRE	LATION OF TERMS	DMT - DILATOMETER TEST		HARD CAN BE EXCAVATED IN SMALL CHIPS TO PEICES 1 INCH MAXIMUM SIZE BY HARD BLOWS OF THE POINT OF A GEOLOGISTS PICK.		BY HARD BLOWS OF THE	A 2 INCH OUTSIDE DIAMETER SPLIT SPOON SAMPLER, SPT REFUSAL IS LESS THAN 0.1 FOOT PENETRATION
SOIL MOISTURE SCALE FIELD MOISTURE	GUIDE FOR FIELD MOISTURE DESCRIPTION	DPI - DTNAMIC PENETRATION TEST Y DRY I			ULUGISTS PICK. I OR GOUGED READILY BY KNIFE OR PICK. CAN BE EXCAV	VATER IN ERACMENTS	WITH 60 BLOWS.
(ATTERBERG LIMITS) DESCRIPTION	SOLDE TON TEED HOLDTONE DESCRIPTION	e - VOID RATIO /d SMI) OR GOOGED READILY BY KNIFE OR FICK. CAN BE EXCAV) SEVERAL INCHES IN SIZE BY MODERATE BLOWS OF A P		STRATA CORE RECOVERY (SREC.) - TOTAL LENGTH OF STRATA MATERIAL RECOVERED DIVIDED BY TOTAL LENGTH
- SATURATED -	USUALLY LIQUID; VERY WET, USUALLY	FOSS FOSSILIFEROUS V VERY			BROKEN BY FINGER PRESSURE.		OF STRATUM AND EXPRESSED AS A PERCENTAGE.
(SAT.)	FROM BELOW THE GROUND WATER TABLE	FRAC FRACTURED VST - VANE FRAGS FRAGMENTS	SHEAR TEST	VERY CAN BE CARVED	WITH KNIFE. CAN BE EXCAVATED READILY WITH POINT O		STRATA ROCK QUALITY DESIGNATION (S.R.O.D.) - A MEASURE OF ROCK QUALITY DESCRIBED BY: TOTAL LENGTH OF ROCK SEGMENTS WITHIN A STRATUM EQUAL TO OR GREATER THAN 10 CENTIMETERS DIVIDED
PLASTIC LIQUID LIMIT		MED MEDIUM		SOFT OR MORE IN THI FINGERNAIL.	ICKNESS CAN BE BROKEN BY FINGER PRESSURE. CAN BE	SCRATCHED READILY BY	BY THE TOTAL LENGTH OF STRATA AND EXPRESSED AS A PERCENTAGE.
RANGE < - WET - (W)	SEMISOLID; REQUIRES DRYING TO	EQUIPMENT USED ON SUBJECT	DDO IECT		ACTNC SECS.	NC	TOPSOIL (T.S.) - SURFACE SOILS USUALLY CONTAINING ORGANIC MATTER.
(PI) PLASTIC LIMIT	ATTAIN OPTIMUM MOISTURE	EGOTEMENT OSED ON SOBJECT	FRUJECI	FRACTURE SP	TEDIA		
FLE THOUSE EARLY		DRILL UNITS: ADVANCING TOOLS:	HAMMER TYPE:	TERM	SPACING TERM VERY THICKLY BEDDED	THICKNESS > 4 FEET	BENCH MARK: N/A
OM OPTIMUM MOISTURE - MOIST - (M)	SOLID; AT OR NEAR OPTIMUM MOISTURE		AUTOMATIC MANUAL		THICKLY PEDDED	1.5 - 4 FEET	
SL _ SHRINKAGE LIMIT		MOBILE B- CLAY BITS			O 3 FFFT THINLY BEDDED	Ø.16 - 1.5 FEET	ELEVATION: N/A
	REDUIRES ADDITIONAL WATER TO	6° CONTINUOUS FLIGHT AUGER	CORE SIZE:	CLOSE 0.16	THICKLY LAMINATED	0.03 - 0.16 FEET 0.008 - 0.03 FEET	NOTES:
- DRY - (D)	ATTAIN OPTIMUM MOISTURE	BK-51 8" HOLLOW AUGERS		VERY CLOSE LES	S THAN 0.16 FEET THINLY LAMINATED	< 0.008 FEET	
DI ACTIO	itv	1 5-7	1 —		INDURATION		
PLASTICITY		CME-45C HARD FACED FINGER BITS		FOR SEDIMENTARY ROCKS, INDURATION IS THE HARDENING OF THE MATERIAL BY CEMENTING, HEAT, PRESSURE, ETC.		INC HEAT DRECOURS STO	
PLASTICITY INDE		TUNGCARBIDE INSERTS	-	FOR SEDIFICIALIST ROCKS, INDUK			
NONPLASTIC 0-5	VERY LOW	X CME-550		FRIABLE	RUBBING WITH FINGER FREES NUMEROUS GF		
LOW PLASTICITY 6-15 MED. PLASTICITY 16-25	SLIGHT MEDIUM	CASING W/ ADVANCER	HAND TOOLS:		GENTLE BLOW BY HAMMER DISINTEGRATES	SAMPLE.	
HIGH PLASTICITY 26 OR MOR		PORTABLE HOIST TRICONE STEEL TEETH	POST HOLE DIGGER	MODERATELY INDURAT	GRAINS CAN BE SEPARATED FROM SAMPLE	WITH STEEL PROBE;	
COLOF		TRICONE TUNGCARB.	HAND AUGER		BREAKS EASILY WHEN HIT WITH HAMMER.		
		OTHER CORE BIT	SOUNDING ROD	INDURATED	GRAINS ARE DIFFICULT TO SEPARATE WITH	STEEL PROBE:	
DESCRIPTIONS MAY INCLUDE COLOR OR COLOR COMBINATIONS (TAN, RED, YEL-BRN, BLUE-GRAY)		OTHEROTHER	VANE SHEAR TEST		DIFFICULT TO BREAK WITH HAMMER.		
MODIFIERS SUCH AS LIGHT, DARK, STREAKED, ETC. AR	MODIFIERS SUCH AS LIGHT, DARK, STREAKED, ETC. ARE USED TO DESCRIBE APPEARANCE.		OTHER	EXTREMELY INDURATE	SHARP HAMMER BLOWS REQUIRED TO BREAK	K SAMPLE;	
				L	SAMPLE BREAKS ACROSS GRAINS.		
							REVISED 09/15/00

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 TOTAL SHEETS

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